On Linearity of Nonclassical Differentiation

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Abstract

We introduce a real vector space composed of set-valued maps on an open set X and note it by S. It is a complete metric space and a conditionally complete lattice. The set of continuous functions on X is dense in S as in a metric space and as in a lattice. Thus the constructed space plays the same role for the space of continuous functions with uniform convergence as the field of reals plays for the field of rationals. The classical gradient may be extended in the space S as a closed operator. If a function f belongs to the domain of this extension, then f is locally lipschitzian and the values of our gradient coincide with the values of Clarke's gradient. However, unlike Clarke's gradient, our generalized gradient is a linear operator.

Key words

functional metric spaces, functional lattices, extensions of differentiation, Clarke's gradient, quasi continuous functions.

AMS Subject Classification

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